

Procedurally Generating Realistic, Simulation Terrains Derived from Low-Resolution Sensed Data

W. A. Harvey, Jr.

ABSTRACT

The US Army's One World Terrain (OWT) initiative aims to deliver a single terrain database that will "provide the virtual dirt to replicate any operational environment." The geospatial data required to globally support all the intended training environments - space, air, land, water, and subsurface - is enormous. VBS Blue, Bohemia Interactive's whole-earth rendering technology, algorithmically enhances lower-resolution geospatial data to procedurally generate realistic, multi-sensory, geotypical terrain, while seamlessly blending this with high-resolution data when available. This significantly reduces the data volume, which lowers storage, network, and computational demands, and helps to fulfill the rapid response requirements for modern military simulation systems.

The benefits of procedural terrain are many, though a common disadvantage is the difficulty correlating terrains, or ensuring a common view of the battlespace, in a heterogeneous simulation training environment. Improving correlation is difficult because different simulation systems have different input data requirements, and these input differences are a recurrent cause of miscorrelation. We have taken the procedural terrain from VBS Blue and stored the components in open formats so they can be ingested by all the participating simulation systems. Though this does not completely solve the correlation problem, providing common geospatial data to all the simulation systems does improve correlation and simplifies data logistics.

In this paper we will review the terrain generation technology in VBS Blue and outline how it enhances publicly available global data to procedurally generate realistic, detailed simulation terrain. Using VBS3 and OpenFlight terrains as examples, we will also show how we can repurpose VBS Blue's procedurally enhanced terrain components as geospatial inputs to other simulation systems, thus providing a common set of source data and improving correlation. Quantitative evaluations of correlation will be presented.

BIO

PRIMARY AUTHOR

Wilson Harvey is Director of Software Engineering at TerraSim, Inc. At TerraSim since 2006, Mr. Harvey supervises the development of new technology and source data preparation products which compliment and inter-operate with TerraTools, TerraSim's geo-spatial database construction product. Prior to joining TerraSim, Mr. Harvey held a succession of research scientist positions within the Department of Computer Science at Carnegie Mellon (1985-2006). During that time he was a member of the research staff at the Digital Mapping Laboratory (MAPSLab) and worked in the areas of computer vision, cartographic feature extraction, knowledge-based systems, and parallel processing. Mr. Harvey is the author of over 25 journal and conference publications in these areas.